

REMARKS

The Office Action dated February 3, 2003, has been carefully reviewed. It is respectfully requested the Examiner reconsider the present application in light of the amendments herein and the remarks.

The Specification has been amended to correct typographical errors in paragraphs [0003] and [0008]. In addition, description of Figure 2 has been added to the **Brief Description of the Drawings** section as it was inadvertently left out of the specification upon filing. Figure 2 was included with the application when filed and is discussed in the body of the specification at paragraph [0019]. Therefore, it is respectfully asserted that no new matter has been presented herein.

The Examiner rejected claim 13 under 35 U.S.C. § 112, second paragraph as being indefinite. The claim has been canceled rendering the rejection moot.

The Examiner rejected claims 1, 5, 8 and 12 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,926,373 to Stevens. Independent Claim 1 of the present invention requires at least one hybrid circuit housed in the cavity. The hybrid circuit is not disclosed in the Stevens reference.

A hybrid circuit is an integrated circuit having components whose substrate technologies differ dramatically from one another. Flip-chip technologies, called hybrid circuits have significantly different substrate technologies, such as thick film ceramic substrates and printed circuit board substrates. These very different technologies make it difficult to combine into a single package. The Stevens reference discloses only large packaged

components, which are the very redundant packages that the present invention seeks to avoid. In the present invention (see paragraph [0015]), the circuit is implemented with die and flip-chips, or integrated circuits without packages.

It is respectfully asserted that independent claims 1 and 5, dependent thereon, are not anticipated by the Stevens reference. It is respectfully requested the Examiner withdraw the rejection of claims 1 and 5. Claims 8 through 12 have been canceled and therefore, the rejection directed to claims 8 and 12 are now moot.

The Examiner rejected claims 4, 6, 9, 14 and 15 under 35 U.S.C. § 103(a) as being unpatentable over Stevens in view of U.S. Patent No. 5,700,754 to Hlaze. The Examiner rejected claims 2, 3, 10 and 11 under 35 U.S.C. § 103(a) as being unpatentable over Stevens in view of U.S. Patent No. 6,407,925 B1 to Kobayashi et al. (hereinafter Kobayashi). The Examiner rejected claims 7, 13, 18 and 19 under 35 U.S.C. § 103(a) as being unpatentable over Stevens in view of U.S. Patent No. 4,717,990 to Tugcu. The Examiner rejected claims 16 and 17 under 35 U.S.C. § 103(a) as being unpatentable over Stevens in view of Tugcu and in further view of Kobayashi.

It is respectfully asserted that the present invention is patentable over the references cited by the Examiner. The present invention is directed to the problem of the difficulty experienced in manufacturing and assembling packaged and unpackaged electronic component technologies that include hybrid electric circuits. It is typical for integrated circuit applications to have strict space and

weight constraints that make packaging an important factor in the overall system design. The integration of different types of circuitry results in redundant integrated circuit and driver packaging, which increases design complexity and product cost. The present invention implements die and flip-chips or integrated circuits without packages. By definition, a hybrid circuit is a mixed technology of packaged and unpackaged components having differing substrate technologies.

The present invention teaches, and claims, a manufacturable interconnect between sensitive hybrid circuits that are manufactured in a clean room environment, and printed wiring board technology that does not require these restrictions. The present invention also teaches, and claims, the substrates are all adhered within the housing cavity and the heat flow is into the housing through the substrate material. The present invention further teaches wirebond interconnect directly to the pins.

The Stevens reference is directed to an encapsulated board-mountable power supply. The Stevens reference teaches attaching large packaged components to both a heat sink for thermal connectivity and to an internal printed wiring board suspended within the power supply. The need for these large redundant packages is precisely what the present invention intends to eliminate.

The Stevens reference also teaches a thermally conductive case that has an integral electrically conductive circuit layer, see column 2 starting at line 55. Stevens teaches that solder connection of components directly to the substrate

and constructing the substrate from flexible metal are critical to the invention (see column 5, lines 5 and 40). In the present invention, the substrates are all adhered within the housing cavity and the heat flow is into the housing through the substrate material.

Further, the hybrid circuits of the present invention include ceramic substrates. Ceramic is not flexible and could not be a substrate used in the invention disclosed in the Stevens reference.

The Stevens reference also teaches a power supply module having a low density. Therefore, the Berquist substrates disclosed in Stevens are likely a single layer of copper interconnect. According to the Berquist substrate designs and in the heat sink of the present invention, the substrates are a multilayer design, where surface area is saved by removing devices from the component packages and assembling them directly to the substrate flip-chip, chip and wire, or die and wirebond techniques.

The power supply taught in Stevens, has two substrates that are part of one circuit, a power supply. The power supply taught in Stevens is not a partitioned circuit strategy. Nor could it have a partitioned strategy even if combined with Tugcu. The present invention has individual circuit blocks that are stand alone in many respects. The stand-alone blocks are modular, and can be used on many dissimilar products. Their manufacture can occur at separate sites, they can be tested separately, and then assembled into the heat sink of the present invention.

Additionally, the assembly of the circuit in Stevens requires blind assembly of the suspended printed wiring board to leads from the Berquist substrate. As discussed above, the present invention does not have a suspended board to provide the interface for the interconnect pins. The present invention relies on wirebond interconnect directly to the pins.

It is respectfully asserted that the independent claim of the heat sink assembly of the present invention is patentable over the Stevens reference, and therefore, it is respectfully asserted the dependent claims are patentable as well. Because Stevens does not show all but the cast aluminum, gel recitations, tongue, adhesive details, and pins, it is respectfully argued that Stevens in combination with any references that may show these features would not result in the Applicants' invention. It is respectfully requested the Examiner withdraw the rejection of claims 2-4, 6, and 7 under 35 U.S.C. § 103.

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Should the Examiner have any questions or comments that may place the application in better condition for allowance, he is respectfully requested to call the undersigned attorney.

Respectfully submitted,

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